



UNITED NATIONS
ESCAP

Annex I

Terms of Reference/Work Plan and Budget

Multi-donor Voluntary Trust Fund on Tsunami Early
Warning Arrangements in the Indian Ocean and
Southeast Asia

A. Overview

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| 1. | Organization | Maldives Meteorological Service, in its capacity as Secretariat to the Working Group of the Indian Ocean and Southeast Asia End-to-End Multi-Hazard Early Warning System |
| 2. | List of supporting organizational documents (attached to the original Grant Proposal submitted by the Department to the Tsunami Regional Trust Fund on 15 February 2008) | Signed resolution of the 1 st Meeting of the Regional Steering Committee of the Indian Ocean and Southeast Asia End-to-End Multi-Hazard Early Warning System |
| 3. | Focal point at organization and relevant contact information | Mr. Ali Shareef Deputy Director-General (Acting DG) Maldives Meteorological Service Hulhule', 22000 Republic of Maldives Tel.: +960-332-6200, Fax: +960-334-1797 E-mail: shareef@meteorology.gov.mv |
| 4. | Project title | Towards sustaining the Indian Ocean and Southeast Asia End-to-End Multi-Hazard Early Warning System |
| 5. | Beneficiary countries | Bangladesh, Cambodia, China, India, Lao PDR, Maldives, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam |
| 6. | Target group/specific locations | National Tsunami Warning Centres |
| 7. | Time frame | 29 May 2009 – 31 January 2010 |
| 8. | Total budget (US\$) and breakdown of funds | 341,374 |

Executive Summary

Countries collaborating in the end-to-end early warning system (EWS) for tsunami and hydro-meteorological hazards in the Indian Ocean and Southeast Asia, namely Bangladesh, Cambodia, China, Lao PDR, Maldives, Mauritius, Mongolia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam, and Yemen, have agreed, in the meeting of the Regional Steering Committee in January 2008 in Bangkok, to take responsibility to sustain the regional early warning arrangement after the current UN Tsunami Regional Trust Fund support to establish the system ends in July 2009. To this end, the countries established a Working Group of five volunteer members, consisting of Lao PDR, Maldives, Myanmar, Sri Lanka and Thailand, with Maldives as the Secretariat, to evolve and implement an action plan for resource mobilization and system management to ensure long-term sustainability.

While collaborating countries have, by signing the meeting resolution, made the first step of committing to sustain the system, engaging countries to translate this commitment into action would be needed. Planning and finance ministries of each country need to be sensitized and influenced to

make investment on early warning a national priority.

Maldives, as Secretariat to the Working Group, submitted this project proposal for UN Tsunami Regional Trust Fund support to undertake activities to enable collaborating countries to incorporate support for sustaining the regional arrangement for multi-hazard warning into their annual budgets.

Key activities include:

- Documentation of the socio-economic benefits of collaborative engagement in a regional multi-hazard early warning system;
- Advocacy with planning and finance ministries in each collaborating country to invest in the regional multi-hazard early warning system.

It is anticipated that the project will result in a funding stream for the continuous operation and maintenance of the regional facility for multi-hazard warning.

B. Needs assessment

Bangladesh, Cambodia, China, Lao PDR, Maldives, Mauritius, Mongolia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam, Yemen and, most recently, India, are currently collaborating in an end-to-end early warning system (EWS) for tsunami and hydro-meteorological hazards, facilitated by the Asian Disaster Preparedness Center (ADPC). This collaboration is based on the following principles:

- 1) For needy and developing countries that are less frequented by tsunamis, yet have high exposure due to dense coastal population, high level of economic activity and the location of infrastructure facilities along the coast, establishing national capacities for the detection, monitoring and evaluation of tsunamis is costly. Pooling resources in a regional warning system is the next best option.
- 2) Each country participates according to its capacity to contribute: China, India and the Philippines, having technical expertise and decades of experience in seismology and/or tsunami, contribute as technical resource partners; developing and needy countries contribute to the operation and maintenance of seismic and sea level observing stations and personnel, through a secondment arrangement, to staff the regional facility and, at the same time, receive on-the-job training.

Eleven other countries have expressed their intentions to participate through letters, signed meeting resolution, and dialogues. These are Bhutan, Comoros, Kenya, Madagascar, Mozambique, Nepal, Seychelles, Somalia, Tanzania, Pakistan, and Timor-Leste.

The establishment of this regional end-to-end multi-hazard early warning system is within the framework of the regional program adopted by collaborating countries in July 2006. The countries, through ADPC, accessed the Tsunami Regional Trust Fund, from which the following are being supported:

- 1) Establishing a network of core seismic and sea level observing stations:
 - a. Four seismic stations in Myanmar (1), Philippines (1), and Vietnam (2) out of the 16 core station network planned by two technical expert meetings in February and April 2005. An additional four of these 16 stations (2 in Lao PDR and 2 in Myanmar) are being contributed by China;
 - b. Four sea level stations in Myanmar (1), Philippines (1), and Vietnam (2) out of the 16 core station network planned by the expert meetings;
- 2) Establishing a regional facility, with capabilities for real/near-real-time seismic, sea level, and deep ocean data receipt, processing and evaluation; tsunami numerical modeling; and tsunami watch dissemination to participating countries;



- 3) Capacity building of national tsunami warning centers (NTWCs) in:
 - a. Sea level station operation and maintenance (Myanmar, Philippines and Vietnam)
 - b. Multi-purpose use of sea level stations (Regional)
 - c. Tide data use and analysis (Regional)
 - d. Seismic station operation and maintenance (Myanmar, Philippines and Vietnam)
 - e. Open-source tsunami numerical modeling
 - f. On-the-job training of national tsunami operational staff by secondment to the regional facility
 - g. Systematic operational information flow and robust decision-making process for the generation of tsunami warnings—Concept of Operations (Myanmar, Sri Lanka, Maldives)
 - h. Set of protocols and procedures for quick and accurate dissemination of tsunami advisories or warnings—Tsunami Alert Rapid Notification System (Myanmar, Sri Lanka, Maldives);
- 4) Capacity building of national disaster management organizations
 - a. Standardized emergency management system for emergency quick response—Incident Command System (Myanmar, Sri Lanka, Maldives);
- 5) Capacity building of local institutions and communities
 - a. Community-level risk assessment, disaster preparedness and mitigation, and coastal management for risk reduction—Coastal Community Resilience (Myanmar, Sri Lanka, Maldives);
- 6) Tsunami risk mapping at 30 selected sites.

The Danish International Development Agency (Danida) has contributed a high-performance computing (HPC) facility at ADPC, primarily to assist national hydro-meteorological services (NHMSs) in their research efforts to continuously improve their products to meet user requirements, but importantly, to allow more regular NHMS interaction for sustaining tsunami warning. This HPC facility would also allow multiple and faster computing for tsunami numerical modeling.

Although considerable work in the regional program is now being supported, gaps still remain in the following areas:

- 1) Number of seismic and sea level observing stations in the regional network vis-à-vis the designed number;
- 2) Resources for the continuous operation of the regional facility for tsunami watch provision;
- 3) Capacity of NTWCs in seismic data acquisition, processing and interpretation;
- 4) Feedback mechanism from warning information users to improve system performance.

Noting that current support is able to establish the regional facility, but not its continuous operation to serve participating countries as a regional tsunami watch provider, the 1st Meeting of the Regional Steering Committee of heads of national focal points for tsunami warning from 24-25 January 2008 in Bangkok, while considering sustainability of the regional early warning facility, collectively agreed in a signed resolution to take responsibility to sustain this regional early warning arrangement. A Working Group of 5 volunteer members (Lao PDR, Maldives, Myanmar, Sri Lanka and Thailand, with Maldives as Working Group Secretariat) was constituted to develop and monitor an action plan for resource mobilization and system management to ensure sustainability.

While collaborating countries have, by signing the meeting resolution, made the first step of committing to sustain the system, it is necessary to engage countries to translate this commitment into action. Planning and finance ministries of each country need to be sensitized and influenced to make investment on early warning a national priority.

This project proposal is submitted for UN Tsunami Regional Trust Fund support to undertake activities to enable national financial systems to incorporate collaborating country support into their annual budgetary processes.

This proposal also addresses the following unmet needs identified by the ESCAP Mapping Study:

- System sustainability;
- Integration of tsunami early warning system into socio-economic context.

C. Problem analysis and project design

The 1st Regional Steering Committee Meeting looked at the progress of regional program implementation. It noted that current funding provides for the initial establishment of a regional network of real-time broadband seismic and near-real-time sea level observing stations, establishment of a regional facility for tsunami watch provision, and capacity building of NTWCs, disaster managers and selected local communities, but not of the continuous operation of the regional facility when the current funding ends. Among the sustainability strategies discussed is the integration of country support into national budgets for sustaining the system.

D. Target group

The proposed project targets National Tsunami Warning Centers as they mobilize resources for the continuous operation of the regional facility for multi-hazard warning.

E. Project strategy

As mentioned earlier, the Regional Steering Committee constituted a Working Group, with Maldives as Secretariat, to develop and implement resource mobilization and system management plans. The main strategy is to mobilize support from:

- a) national budgets, in terms of annual contribution towards regional facility operation;
- b) NTWCs, in terms of seconded personnel;
- c) technical resource countries, such as China, India and the Philippines;
- d) development funding agencies, since most participating countries are developing/least developed; and
- e) the UN Tsunami Regional Trust Fund, in the interim, while national systems take steps to incorporate contributions into their annual budgets.

Appendix 1 presents the annual operating cost of the regional facility for multi-hazard early warning. The proposed project would develop policy instruments to integrate the regional EWS into national systems, and financial instruments to enable contributions by collaborating countries. National contributions would take into consideration each country's risk level, resource availability, and commitment/ policy to assist its neighbors. Advocacy to sensitize and prompt policy and decision makers into action would then be undertaken. Annual support should be integrated into national budgets by fiscal year 2010.

Increasing the number of collaborating countries would decrease the financial contribution required per country. In this regard, MoUs with countries which have expressed interest to participate, in particular Bhutan, Comoros, Kenya, Madagascar, Mozambique, Nepal, Seychelles, Somalia, Tanzania, Pakistan, and Timor-Leste, would be pursued. A regional meeting with these countries, to present system capacities and services, and benefits and cost for collaborating countries, would be organized to advocate for national budgetary support. This meeting would be a follow-on to the workshop held in Mauritius in April 2007, which introduced the regional arrangement for multi-hazard warning.



F. Results Framework

i. Capacities developed

Relevant decision makers in collaborating countries are aware of the early warning centre and have taken a decision on the extent to which to support it.

Indicator: Evidence by the end of the project that decision makers responsible for national planning and budgets are aware of the early warning centre and have taken a decision on the extent to which to support it.

ii. Project activities

Expected Result 1: Collaborating countries contribute resources towards sustaining the regional arrangement for multi-hazard warning

Activities:

1.1 Documentation of the socio-economic benefits of collaborative engagement in a regional multi-hazard early warning system. The document will be used as an advocacy tool to convince policy and decision makers to invest in the regional early warning arrangement. The documentation would look at historical disaster events and their economic costs (damage, lost opportunities, etc.) in each country, and indicate the benefits of investments made in early warning and in reducing costs imposed by natural disasters on national economies.

Indicator: The document is used in the deliberations of policy and decision makers

1.2 Meetings between Working Group members and key government policy and decision making body/ies in each collaborating country to advocate for resource support to the regional multi-hazard early warning system. Three meetings in each country will be undertaken to: 1) discuss the sustainability plan and propose actions for the country's consideration; 2) follow-up on proposed actions and draft a national action plan; 3) finalize the national action plan, with resource commitments.

Indicator: Country contribution presented in a regional meeting of policy and decision makers on EWS sustainability

1.3 Regional meetings of high-level policy and decision makers from each collaborating country on national contributions for EWS sustainability. Two meetings will be undertaken: 1) show the progress of the regional arrangement for multi-hazard early warning and deliberate on its socio-economic benefits for collaborating countries, and consider actions for sustainability; 2) report on the progress of integrating support for the regional arrangement into national institutional systems, and in integrating the regional system into other regional institutional systems, such as the Association of Southeast Asian Nations (ASEAN) (ASEAN Earthquake Information Center, ASEAN Specialized Meteorological Center, etc.) and the Asian Disaster Reduction Center, to avoid duplication, and share national commitments. These meetings may be organized back-to-back with the Regional Steering Committee meetings.

Indicator: Recommendations and actions taken are reported in the quarterly progress report of the project

1.4 Working Group meetings to monitor progress of sustainability plan implementation

Indicator: Progress and follow-up actions reported in the quarterly progress report

Expected Result 2: Overall coordination, monitoring, evaluation and audit of the project are adequately undertaken

Activities:

2.1 Undertake project monitoring, evaluation and administration, as well as progress reporting

Indicator: Biannual progress reports submitted to ESCAP

2.2 Document project experiences, accomplishments, and lessons for external sharing

Indicator: Project experiences, accomplishments and lessons shared with stakeholders and the general public

2.3 Undertake end of project review

Indicator: Final audit and final independent evaluation report for the project submitted to ESCAP

iii. Expected project impact

It is anticipated that the project will result in a funding stream for the continuous operation and maintenance of the regional facility for multi-hazard warning. NTWCs would then have continuous access to tsunami hazard and risk information from the regional facility.

Indicator: Stable funding stream of at least US\$ 1.3 million per year is provided by collaborating countries by mid 2011 for continuous operation of the early warning centre.

G. Organizational capacity

The Maldives Meteorological Service (MMS) representing the Republic of Maldives, has accepted the responsibility to serve the Working Group of the Indian Ocean and Southeast Asia End-to-End Multi-Hazard Early Warning System as its Secretariat, with approval from the Ministry Housing, Transport and Environment, Energy and Water. In this capacity, MMS will have the responsibilities of coordination and project management and implementation. MMS has observing and prediction capabilities in meteorology; its capacities in marine meteorology and seismology are continuously being enhanced since their addition to the Department's areas of responsibilities in 1993 and, more intensively, since the 2004 tsunami. MMS, therefore, has technical capacity to implement the project. Also, MMS has the confidence of the collaborating countries when they approved Maldives' nomination as Working Group Secretariat, which is essential in effectively coordinating project activities.

Activities under Activity 1.1 will be subcontracted to an appropriate organization.

H. Contribution to regional coordination and/or cooperation towards the establishment and functioning of a regional early warning system for tsunamis and other hazards in the Indian Ocean and Southeast Asia region?

The ADPC-facilitated early warning system includes 14 countries collaborating on a regional arrangement for multi-hazard warning in the Indian Ocean and Southeast Asia. Results of the project will also benefit Bhutan, Comoros, Kenya, Madagascar, Mozambique, Nepal, Seychelles, Somalia, Tanzania, Pakistan, and Timor-Leste, which have expressed interest to participate in this regional arrangement. Most of these countries are members of the Intergovernmental Oceanographic Commission, which coordinates Indian Ocean tsunami warning system (IOTWS) development.

The proposed project contributes to the wider IOTWS through the following:

- An operational 24/7 regional tsunami watch provider;
- A model of an end-to-end tsunami early warning system, with collaborating countries as system owners and active participants.

I. How will lessons, results and experiences from the project be collected and disseminated?

Lessons and experiences will be collected and shared through:

Documentation as required by specific activities as detailed in Section F;



- Sharing with ADPC regularly; ADPC to share internally so that lessons and experiences are used by its other projects;
- Sharing with stakeholders through reports, articles and updates;
- Sharing with the Intergovernmental Coordination Group (ICG) for the IOTWS ;
- Sharing widely with the public through the print media (national newspaper, ADPC newsletter, etc.) and early warning system website.

J. Sustainability

Sustainability is the desired outcome of the proposed project. Integration of national contributions into national budgets would ensure a steady flow of financial support towards system operation and maintenance.

K. Gender

A separate section in all meetings will be added to highlight differential vulnerabilities of women, and evolve and implement concrete plans to address these concerns.

L. Partnerships

The table below details existing partnerships and their role and expected involvement in project implementation:

| <i>Institution</i> | <i>Role</i> | <i>Expected involvement in project implementation</i> |
|---|---|--|
| Collaborating/participating countries (National Tsunami Warning Centres) through the Regional Steering Committee, Working Group, and Working Group Secretariat mechanisms | System owner, implementing partners | <ul style="list-style-type: none"> • Administration of the regional facility for tsunami watch provision • Advocacy for resource mobilization • Implement national and local level activities • Ensure availability to participate in regional activities • Receive watch messages from the regional facility and use them for issuing warnings • Provide information on forecast point locations • Involvement in hazard mapping and risk assessment • Guide users in utilizing products for disaster preparedness and mitigation |
| Asian Disaster Preparedness Center | Implementing partner | <ul style="list-style-type: none"> • Organize, facilitate, provide technical inputs to workshops, and meetings on receipt of request from the Working Group Secretariat/ Regional Steering Committee. |
| IOC ICG/IOTWS | Global coordination of efforts to establish IOTWS | <ul style="list-style-type: none"> • Provides technical standards and protocols • Ensures inter-operability of systems |

M. Expected counterpart contributions (in-kind or in-cash)

None

N. Reporting

MMS shall submit to ESCAP biannual progress reports, together with cumulative financial reports, on 31 May and 30 November within the duration of the project, following a progress reporting template provided by ESCAP.

MMS will also provide a terminal report within one month of the agreed project end date and copies of all evaluations and audits carried out under the project.

